

SIEMENS

MAMMOMAT 3000



IONTOMAT Automatic Exposure Control (AEC)

Modification Instructions

RX B7-230.092.03.01.02

Replaces:

english
11.95

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63 85 988

Modification Instructions

0 - 1

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General

This modification will improve the accuracy and repeatability of the IONTOMAT. The IONTOMAT board, the double detectors and the firmware are replaced.

The tolerances of the AEC are specified for $\gamma \leq 4$. Since the density is highly dependent on the developing process, we recommend you to check the constancy of the developing process by **doing a sensitometry check before and after the modification.**

Components required

Modification kit, part no. 63 82 647, comprising

2 Double detectors	38 47 626
1 Circuit board	38 47 634
Firmware	63 15 704 ver. 1.6 (Stand)
	63 16 215 ver. 1.6 (Generator)
	63 16 231 ver. 1.3 (Service program)
6 screws	69 45 299
8 nuts	60 33 989
Loctite	66 46 707
6 nuts	62 53 723
8 washers	60 47 948

Meters and appliances required

Digital voltmeter (e.g. Fluke type 8060A, part no. 97 02 101 Y4290, or Fluke type 87, part no. 97 03 976 Y4290)

Service PC (e.g. Siemens Nixdorf PCD3-NSX/20 or similar) with connecting cable (PC – Generator), part no. 99 00 440 RE999

Sensitometer, e.g. X-Rite 333, part no. 97 02 424 Y1996

Densitometer, e.g. X-Rite 331, part no. 97 02 416 Y1996

Plexiglass plates (three plates measuring 150 mm x 150 mm x 20 mm and one plate measuring 150 mm x 150 mm x 10 mm, part no. 85 49 438 and 97 88 423 respectively, or according to Speedinfo RX 32-95)

Soldering equipment (not needed if stand software 63 15 704 is installed)

Documents required

Wiring diagrams MAMMOMAT 3000

1 - 2

Prerequisites

Installation and Start-Up Instructions M3000
Operating Instructions M3000

Tools required

Standard tool kit, ESD tools

Time required

12 hours

Modification of object tables

2 - 1

Modification of object tables

In connection with this modification, you must also install a detector grid in all tables, see modification instructions "Object tables" RX B7-120.092.02.

Replacing the double detector

3 - 1

Removing the base-plate cover

- System OFF.
- Loosen the two screws (1/Fig. 1) to remove the cover over the table locking device.
- Loosen the four screws (2 and 3/Fig. 1) to remove the table-locking device from the base plate.
- Loosen the ten screws (4/Fig. 1) and remove the base-plate cover. The double detector is now accessible.

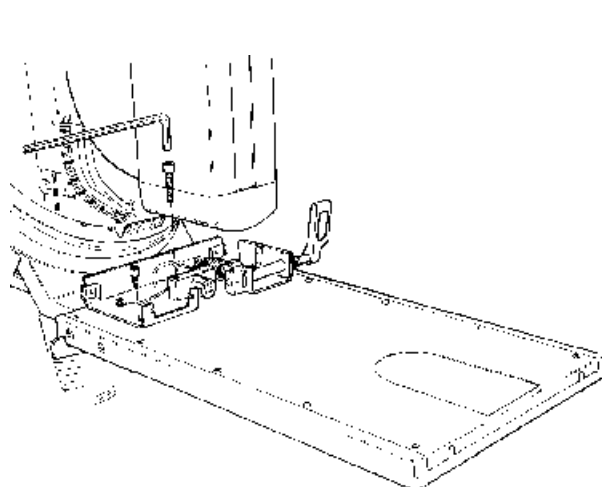
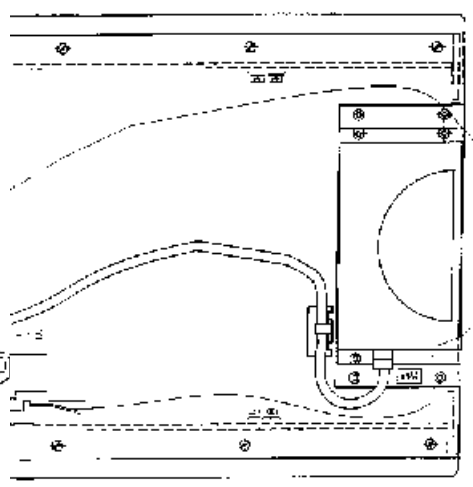


Fig. 1



X884

Fig. 2

Replacing the double detectors

- Disconnect X884 from the detector.
- Unscrew the four nuts (1) and lift up detector with insulating plate. Loosen the three screws (2) to remove the detector from the insulating plate. Replace the double detector with the new one, part no. 38 47 626, included in the modification kit. Use the new screws and nuts included in the delivery and secure with Loctite. Make sure that there is no metallic contact to the detector and that plug X884 is properly connected, see Fig. 2.
- Check the functioning of the AEC detector positioning levers.
- Fasten the base plate cover.
- Repeat this procedure on the other "wing" (base plate).

Replacing circuit board D701

- Open the generator by removing the front cover as follows:
Pry loose the plastic strips (1/Fig. 1) on both sides, using a screwdriver or similar tool. Loosen the sixteen screws now accessible (eight on either side) and remove the front cover (2/Fig. 1).

Note: *Be sure to keep the contact washers (there are four contact washers on either side). These are needed again when reassembling the front cover, to establish protective ground connection.*

- Before replacing circuit board D701, be sure to make a backup of the installation parameters for the IONTOMAT, see Service Instructions MAMMOMAT 3000.
- Replace D701 with the new circuit board, part no. 38 47 634, and new software PROM J113, see wiring diagram, pages 5-11 and 6-1. Use ESD tools.

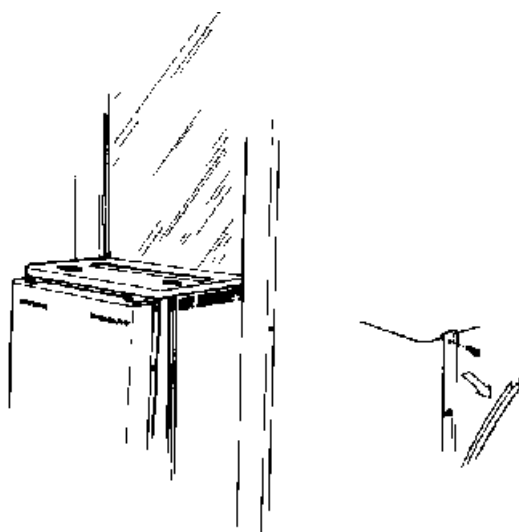


Fig. 1

Components included

Stand PROM D801 / I 9 part no. 63 15 704 ver. 1.6

Generator PROM kit: part no. 63 16 215 ver. 1.6
Control Panel PROM D740 / I 10
IONTOMAT PROM D701 / J 113
Master PROM D702 / J 39

Service PC Program part no. 63 16 231 ver. 1.3

Note:

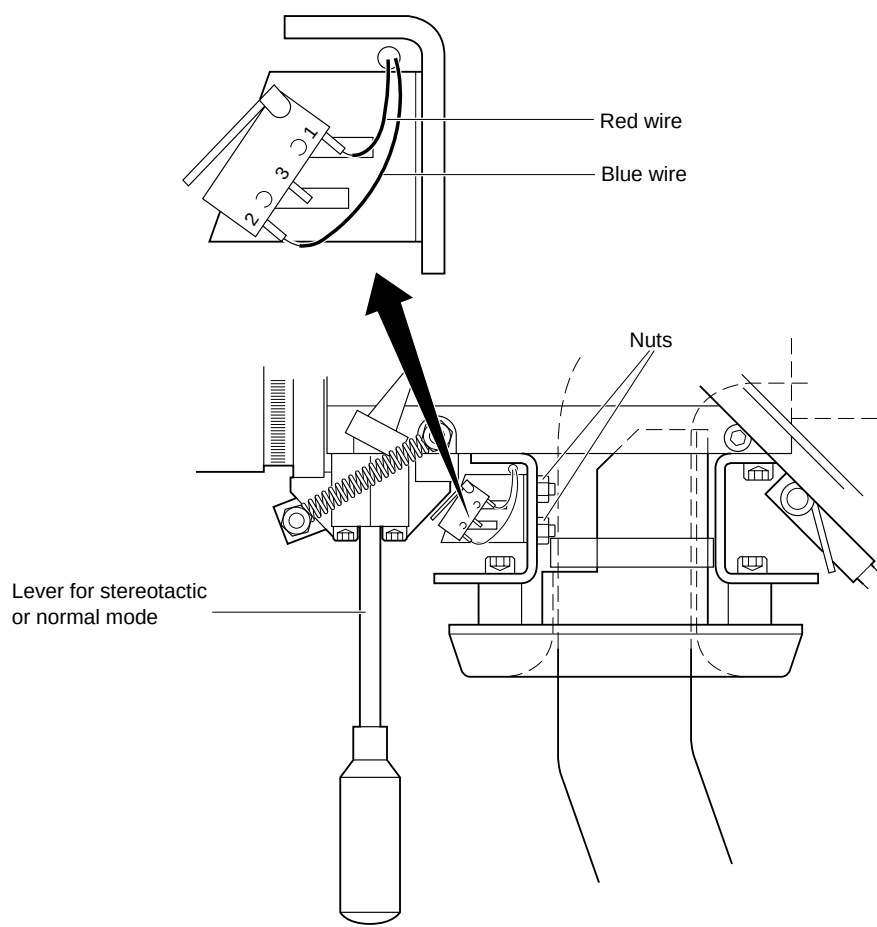
When upgrading 63 15 720 and 63 15 704 with the same part number, but a later version number, or when upgrading 63 15 720 to 63 16 215, steps 1, 2, 3, 4, 6, 9, and 11 under "Installation" below shall be disregarded.

Installation

- 1 Mains and system ON.
- 2 Press the leftmost program button and record kV, density correction, speed button (H or D and anode/filter combination. Repeat this procedure for the remaining three programs.
- 3 Using the service program (63 16 231, version 1.3 or later versions with the same part number), enter "Main menu" and select "backup". Make a backup of the control panel on a diskette.
- 4 Mains and system OFF.
- 5 Remove the right side cover from the stand, see Installation and Start-Up Instructions for MAMMOMAT 3000. Remove the shaft covers from the swivel-arm system.
- 6 Remove the shaft covers from the swivel-arm system. Change polarity of stereo-lever switch S860 (switch for stereotactic or normal mode) by disconnecting the blue wire from pin 3 and soldering it to pin 2, see Fig.1. To facilitate the soldering, loosen the nuts and take out the switch.

5 - 2

Installing the new firmware



9448 0023

Fig. 1 Changing polarity of the stereo-lever switch

- 7 Exchange the remaining three EPROMs (Control Panel, Master and Stand):

Note:

Make sure that the PROM is positioned with its semi-circular mark in the same direction as the mark on the actual p.c. board. Use ESD tools.

I 10 on circuit board D740, see wiring diagram, page 5-10. To have access to circuit board D740, the shielding grid cover should be removed. Loosen the screws on the side holding the grid cover. Disconnect protective ground from the grid cover and remove grid cover.

J 39 on circuit board D702, Master PC board, see wiring diagram, pages 5-5 and 6-1.

I 9 on CPU board D801, see wiring diagram, page 3-6 (Stand).

- 8 Using the service program (63 16 231, version 1.3 or later versions with the same part number), enter "Main menu".
 Mains and system ON.
 An error will now be displayed, due to the new PROM version.
- 9 Using the service program, load the backup from the diskette into the control panel.
 Acknowledge by pressing the limit button on the control panel.
- 10 Check the exposure release. Check also the rotary motion and the height adjustment of the swivel-arm system for proper function, see Installation and Start-Up Instructions MAMMOMAT 3000.
- 11 Program the four programs with the values recorded in step 2 above.
 See also Operating Instructions MAMMOMAT 3000.
- 12 System and mains OFF.
 Reinstall the shielding grid cover.

kV-adjustment

Check the kV as follows:

- System OFF.

Warning! *After shut-down of the system, there may still be about 380 V d.c. present on the intermediate circuit. This will be indicated by LED V24 on p.c. board D710. The voltage will drop to less than 30 V within about 3 minutes; the LED goes out at about 30 V.*

- Connect DVM between the lower ends of R72 and R73 (on the left side of the high tension plug) on D710 circuit board.
- System ON.
- Set 25 kV and maximum mAs on the control console.
- Trigger an exposure and check that the DVM shows $\pm 2.500 \text{ V} \pm 0.010 \text{ V}$.
- If necessary, adjust R43 on D702 and trigger another exposure.

Note: *Do not overload the tube. R43 need not be relocked with locking paint.*

Programming

7 - 1

Sensitivity

Programming

The tables in this kit are optimized for the following four film/screen combinations.

Film	Screen	Cassette	Sensi- tivity	Correction curve
Kodak Min-RE	Kodak Min-R	Kodak Min R2	11	A
Fuji UM-MA HC	Fuji HR Mammo Fine	Fuji EC-MA	9.5	B
Agfa Mamoray MR6	Agfa MR Detail S	Agfa MR Details S	7	C
Dupont Microvision C	Dupont Quantavision ME	Dupont Quantavision	12	D

Program the IONTOMAT values as follows:

Sensitivity

Start with the sensitivity listed in the table for the film/screen combination used by the customer. Program this value for "wing 1" and "wing 2" under H. If the customer uses one more film/screen combination, program this value for "wing 1" and "wing 2" under D, otherwise program the same value as under H. **If the film/screen combination used by the customer is not listed in table 1, start with sensitivity 11.**

Note: *Be sure to use the same type of cassette, screen and film in each object table as the customer uses.*

IONTOMAT PM - Sensitivity

	H	D
Wing 1	11.0	11.0
Wing 2	11.0	11.0

Valid entries from 0 to 31 in ½ E.P.

Input of decimal point not required!

1 Help 2 Save 3 5 6 7 8 9 10 Quit

Values from 0 to 31 can be entered.

Siemens-ElEMA AB
Solna, Sweden

SRX-MK

RX B7-230.092.03.01.02
Rev. 01 11.95

MAMMOMAT 3000
Automatic Exposure Control

Sensitivity correction

IONTOMAT PM - Sensivity correction

	Wing 1	Wing 2
Without grid	.0	.0
With grid	.0	.0
Magnification	.0	.0

Valid entries from -8 to 8 in ½ E.P.

For pos entries 1st digit is < space >, for neg entries type < - >.

Input of decimal point not required!

1 Help 2 Save 3 5 6 7 8 9 10 Quit

Indicates the sensitivity correction for different types of object tables.

The position "without grid" applies to Stereotactic Biopsy Attachment as well.

Factory-set to "0", "0", "0".

Different film-density corrections can be programmed for the different tables with the "Sens-cor" module.

Correction curve

- Program "Correction curve" according to table 1 above (see also M3000 Service Instructions). **If the customer uses another combination or a mixture of those listed in table 1, please refer to page 7-3.**

IONTOMAT PM - Correction curve

	Curve number
Speed H	_ A
Speed D	A

1 Help 2 Save 3 5 6 7 8 9 10 Quit

For further information, please refer to the installation manual, chapter "Start-up and functional test of the IONTOMAT PM". Values shown as delivered.

Other film/screen combinations

In case the customer uses another film/screen combination than those the correction curves are optimized for, see table 1 of correction curves on page 7-1, proceed as follows:

Begin with curve C, speed H, and make test exposures using a grid table at 25 kV (Mo/Mo), 2 and 6 cm plexi (5 cm if limit (ER 550) or ER 013 occurs, due to insufficient dose rate). If the image from 6 cm plexi (O.D.-6 cm) is lighter than the one from 2 cm plexi (O.D.-2 cm), choose correction curve A or B (A makes images from thick objects darker than B does, i.e. A corrects more than B). On the other hand, if O.D.-6 cm is darker than O.D.-2 cm, choose curve D.

Repeat the test with the chosen curve. The difference between O.D.-6 cm and O.D.-2 cm (Δ O.D.) should be less than 0.30 O.D.

2. Now test 27 kV, 2 and 6 cm. Try even 30 and 35 kV if these kV's are of interest for the customer. If this Δ O.D. is ≤ 0.30 O.D., go to 3. If not, it is necessary to test another curve (choose between A, B, C and D) at 27 kV. Choose the best one and repeat the test at 25 kV. Continue in this manner until the result is as good as possible for the kV's of interest for the customer. Diagrams 1, 3, 5 and 7 on the following pages can be of help. Note that the steeper the curve is, the more the thicker objects are corrected (they will be darker).
3. Check also the correction with 2 cm plexi between the different kV values of interest. If this Δ O.D. is ≤ 0.30 O.D., an acceptable curve has been chosen. It may not be possible to reach the specified O.D. corrections, choose then the best compromise for the customer's needs.
4. Do the same tests with magnification table, but use 2 and 5 cm plexi instead. The permissible Δ O.D. for magnification tables is ≤ 0.40 O.D. If the result is not satisfactory, try another curve with speed button D. Choose between correction curves A, B, C and D. Diagrams 2, 4, 6 and 8 on the following pages can be of help. Normally, the magnification tables and the contact exposure tables function properly with the same curve family, which means that the other speed button can be used for another film/screen combination.
5. Test the chosen curve/curves with the other anode/filter combinations as well.

Note: *The film density levels may vary from cassette to cassette. Therefore, be sure to use one and the same cassette for all test exposures.*

Correction curve diagrams

The following diagrams approximately show the families of correction curves. The axes "Quotient" and "Transparency correction" are the values shown in "Normal mode, Iontomat data" with the service program.

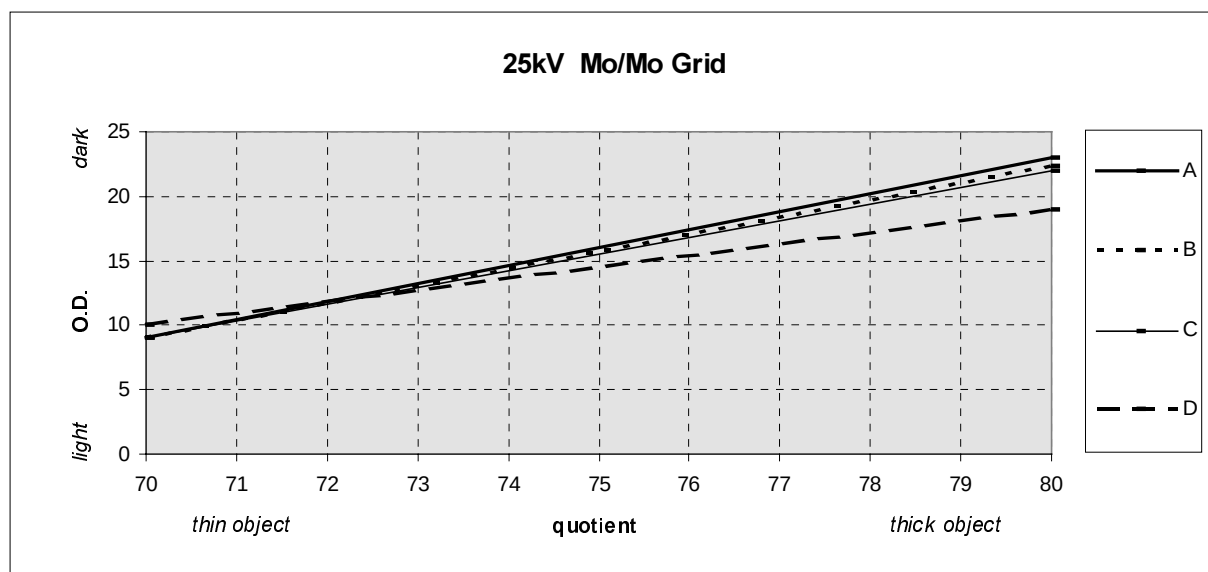


Diagram 1

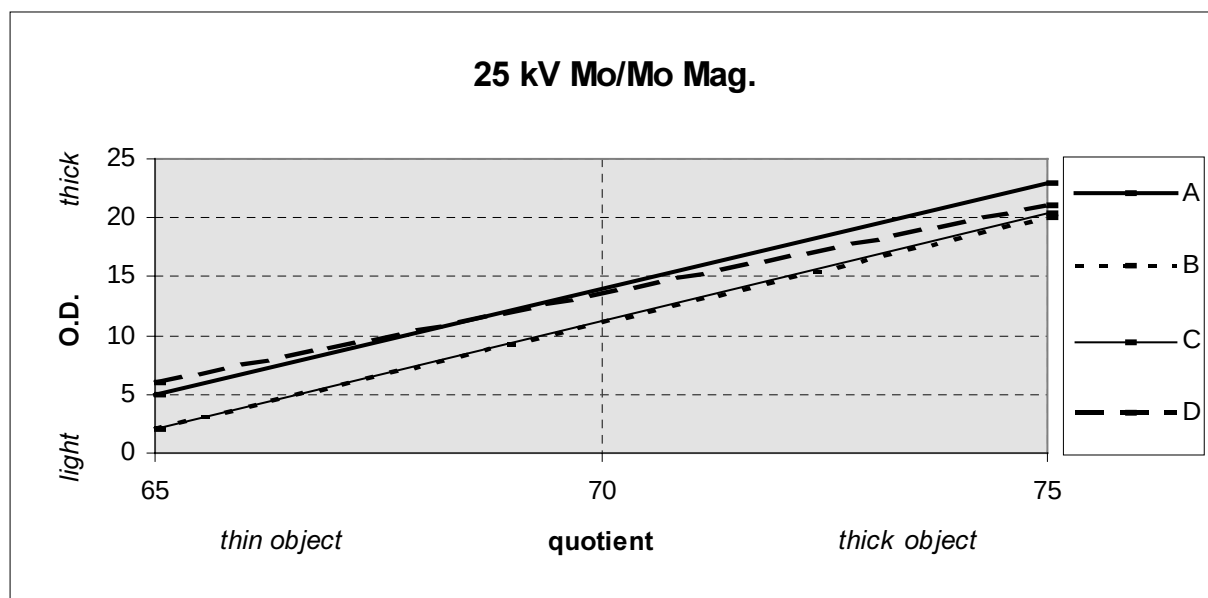


Diagram 2

Programming

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Correction curve diagrams

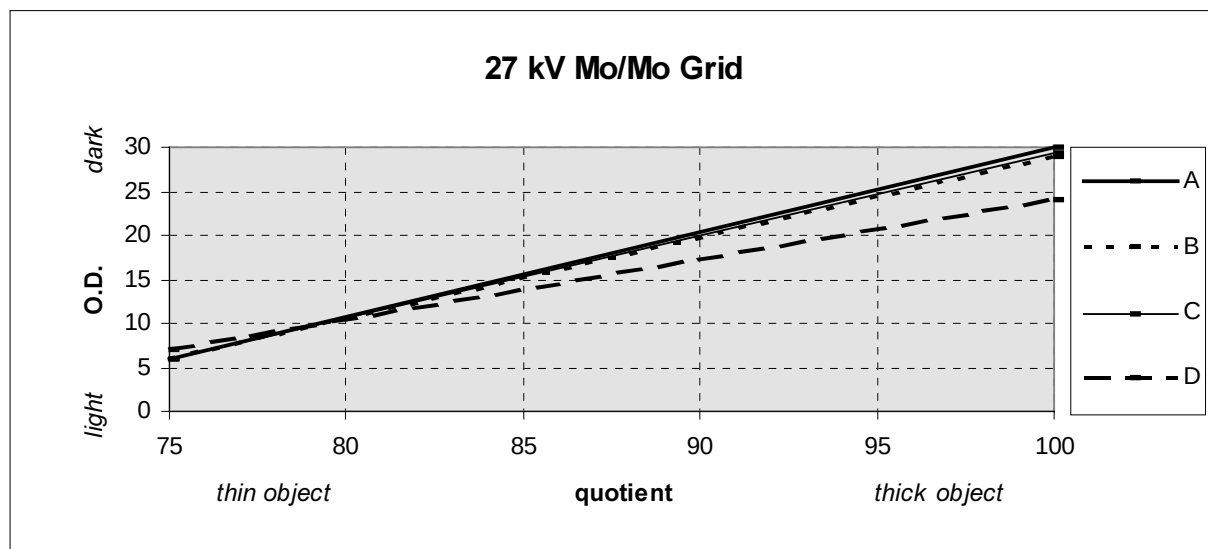


Diagram 3

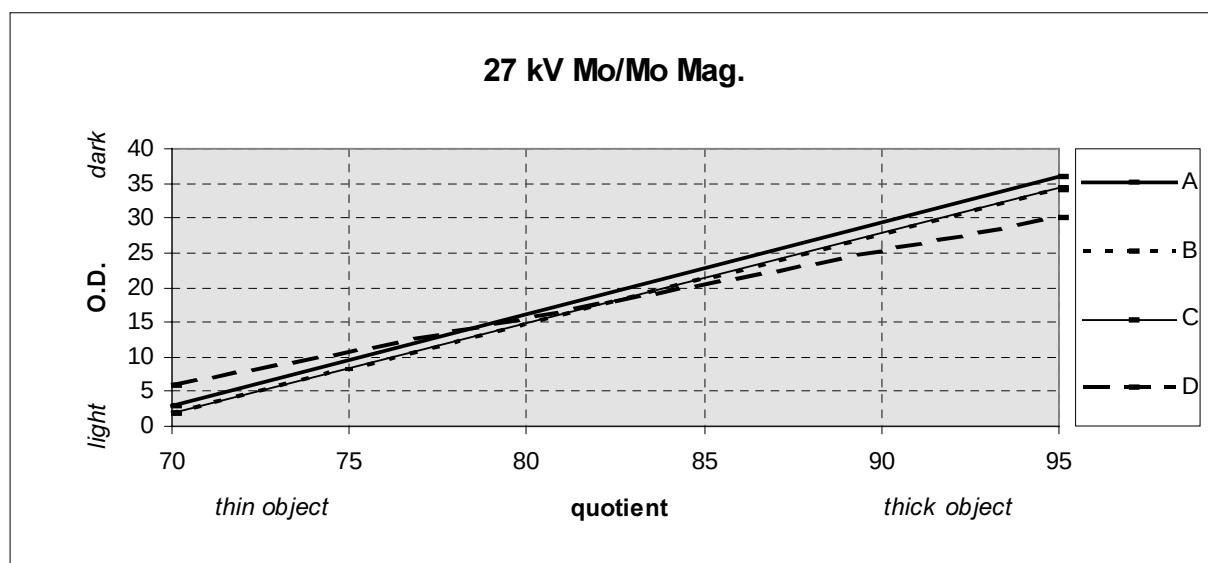


Diagram 4

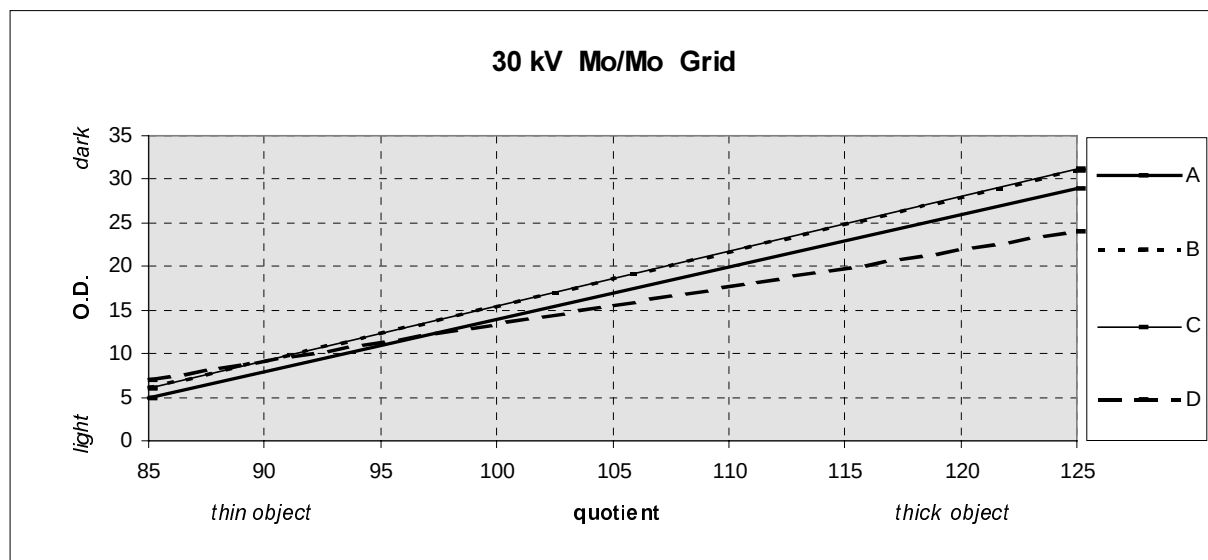


Diagram 5

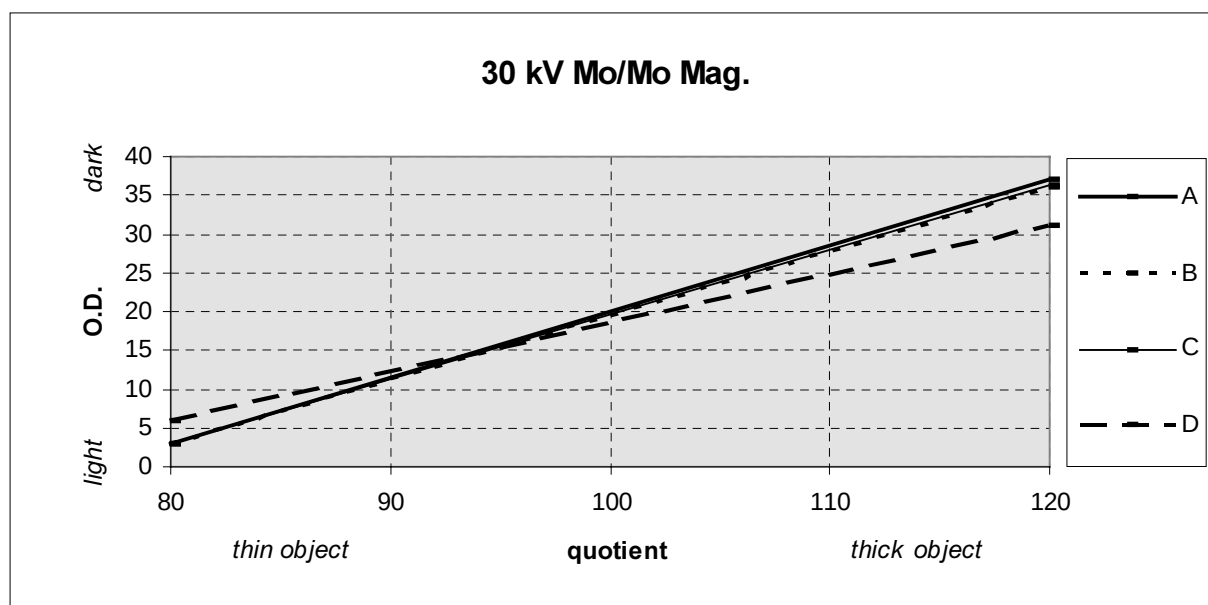


Diagram 6

Programming

7 - 7

Correction curve diagrams

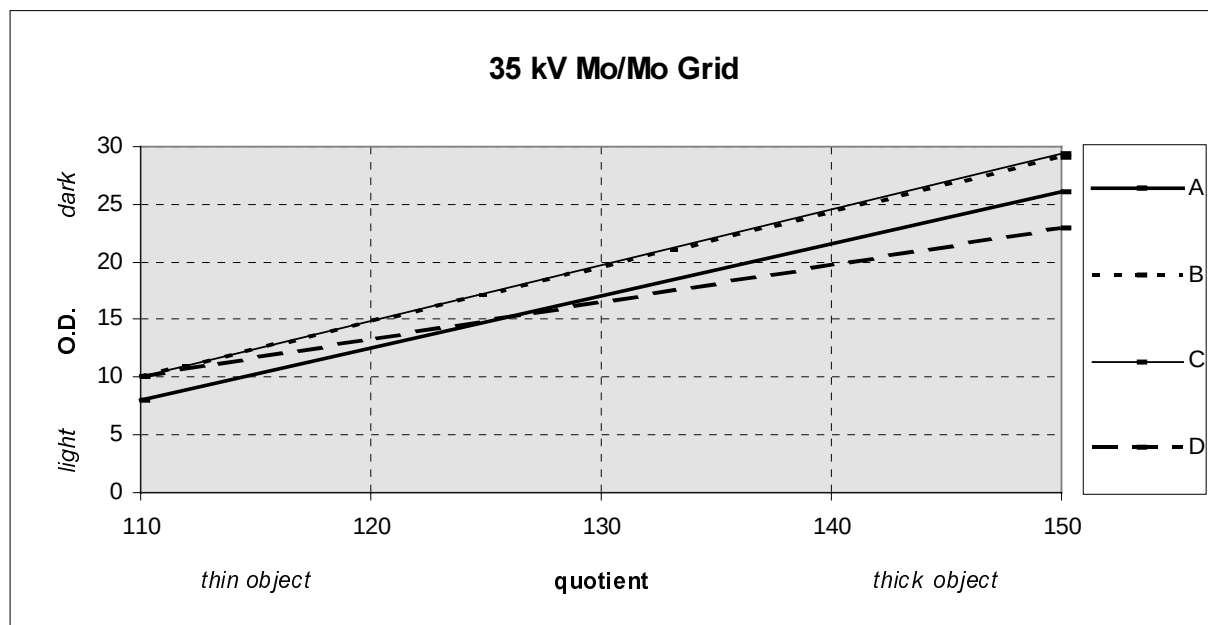


Diagram 7

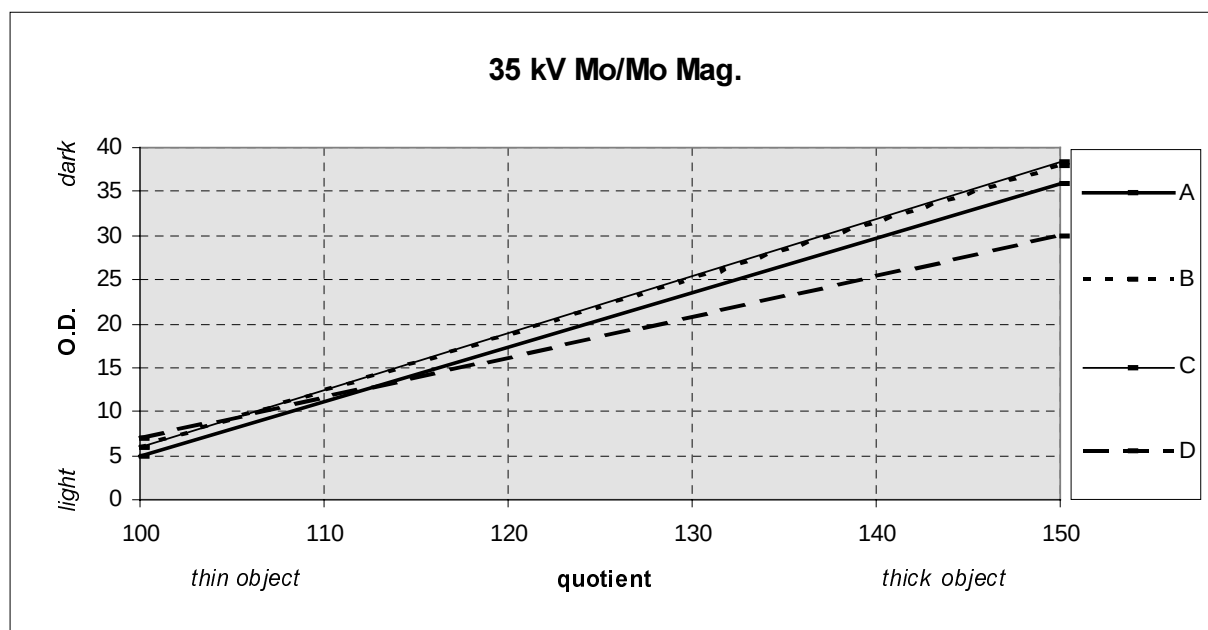


Diagram 8

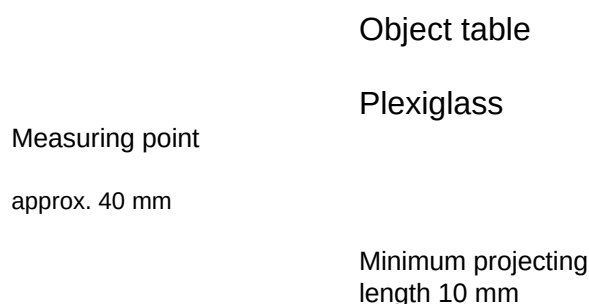
Checking the film density

The sensitivity to be programmed must be determined by means of test exposures with anode/filter combination Mo/Mo at 25 kV, or kV preferred by the customer, and 20 mm plexiglass.

The plexi must extend at least 30 mm behind the rear edge of the detector marking on the compression plate and 10 mm beyond the chest wall edge of the table.

The detector shall be nearest the chest wall.

- When making test exposures, ensure correct positioning of the plexiglass plates.



Note: *Detector nearest chest wall. Place the plexi plates in the same position for all exposures and measure the density as shown above on the emulsion side of the film.*

Start with the sensitivity listed in table 1 and adjust a density of approx. 1.5 ("Sensitivity H"). Repeat this procedure on the other "wing" (base plate).

Change to the other film/screen combination, if used, and program "Sensitivity D" for the density as above. Repeat this procedure on the other "wing" (base plate).

The final values are dependent on the type of cassette used and desired optical density.

Checking the automatic transparency adaption 9 - 1

Checking the automatic transparency adaption

Check the automatic transparency adaption with a grid table with 20, 40 and 60 mm plexi at the voltage(s) preferred by the customer (within 25 - 35 kV) and all anode/filter combinations. If the dose rate is too low (error 013 or "Limit"), use 50 mm plexi instead of 60 mm.

Tolerance: < 0.3 density difference at constant voltage and thickness
20 - 60 mm.

< 0.3 at constant thickness and 25 - 35 kV.

Note: *Tolerance valid for grid tables and film/screen combination according to table 1.*

These limits apply for film with max. gamma 4.0 measured at the density chosen.

Note: *The film density levels may vary from cassette to cassette. Therefore, be sure to use one and the same cassette for all test exposures.*

9 - 2 Checking the automatic transparency adaption

Checking the automatic transparency adaptation and OPDOSE

The unit is factory-set with the following values, which are to be regarded as recommendations. Changes can be done with the service PC program (Configuration ⇒ Miscellaneous ⇒ Auto limits).

Thickness	kV	Anode / filter combination
Th ≥ 60 mm	26	W / Rh
60 > Th ≥ 45 mm	27	Mo / Rh
45 > Th ≥ 30 mm	27	Mo / Mo
30 mm > Th	26	Mo / Mo

- When making test exposures, follow the instructions on page 9-1 for positioning the plexiglass plates and measuring the density.

Note: Both "wings" must be checked.

- Start with 60 mm plexi and compress. Make sure that the display indicates at least 60 mm. Make an exposure and measure the optical density. Repeat this with 50 mm, 40 mm and 20 mm plexi.
- Change density with the density setting buttons on the control panel as needed (the panel programming switch must be ON, see Service PC program – Configuration ⇒ Miscellaneous ⇒ Panel programming).

The optical density for the four different programs shall be as near as possible to 1.5 O.D. (or the density preferred by the customer). Store with the memory button.

Final procedures

Mount the rear side cover onto the stand. Be sure to use a functioning contact washer and tighten the screw securely in order to establish protective ground connection (see also Installation and Start-Up Instructions).

Mount the shaft covers, if previously removed, onto the swivel arm.

Fit the front cover to the generator and fasten it with the sixteen screws. Make sure that all eight contact washers (four on either side) are used again as in the original assembly to establish protective ground connection. The washers must be functional and the screws must be securely tightened (see also Installation and Start-Up Instructions).

- Fill out the Update Completion Form and send it back .

